

4. (Once amended) A method in accordance with claim 1, wherein the step of bonding the polymer electrolyte film comprises placing the adhesive [has] having a durometer A hardness of not greater than 90 after cure.

9. (Once amended) A method in accordance with claim 8, wherein the step of providing the adhesive comprises providing the adhesive [has] having a durometer A hardness of not greater than 90 after cure.

#### REMARKS

Claims 8-11, 13-15, 18 and 19 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,989,741 to Bloomfield, *et al.* ("Bloomfield") in view of U.S. Patent No. 5,636,098 to Salfelder, *et al.* ("Salfelder"). Bloomfield and Salfelder also form the bases for § 103(a) rejections of claims 1-6 and 17 in further view of JP 9-199145, and claim 12 and 16 in further view of U.S. Patent No. 5,328,816 to Tamura, *et al.* ("Tamura"). Finally, claim 7 stands rejected under § 103(a) as unpatentable over the combination of Bloomfield, Salfelder, JP 9-199145 and Tamura.

The Applicant has carefully reviewed the May 24, 2000 Office Action, and the foregoing amendments and following remarks are made in response thereto. Claims 3, 4 and 9 have been amended to address the Examiner's helpful comment as to proper grammar, with "has" being replaced by -- having -- at the appropriate locations. Withdrawal of the pending objection to claims 3 and 4 is therefore requested.

As to the remaining § 103(a) rejections, as discussed further below the Applicant respectfully traverses the rejections on the grounds that the cited references do not teach or suggest the present invention, either alone or in combination. Accordingly, claims 1-19

remain pending in the Application for consideration, and the Applicant requests early and favorable reconsideration of the pending rejections and allowance of these claims.

1. **Claims 8-11, 13-15, 18 and 19 Are Patentable Over Bloomfield and Salfelder.**

The Applicant respectfully traverses the rejection of claims 8-11, 13-15 and 18-19 under 35 U.S.C. § 103(a) as unpatentable over Bloomfield in view of Salfelder on the grounds that the cited references do not teach or suggest all the elements of the present invention.

In rejecting claims 8-11, 13-15 and 18-19, the Office Action states that Bloomfield does not teach that the adhesive may be a mixture of epoxy resin and modified silicone, or that the adhesive's modulus of elasticity is not greater than 10MPa or its durometer A hardness is not greater than 90 after cure. Office Action at 2. It is then asserted that Salfelder teaches that "conventional adhesives are used to adhere two insulating layers together," that suitable adhesives include acrylics such as "methacrylate, polyesters, polyamides, polyurethanes, epoxies, silicone containing adhesives, and mixtures thereof," and further that the invention as a whole would have been obvious because "polyurethanes, epoxies, and silicones are all conventional materials for adhering two objects together." Office Action at 3. Finally, the Office Action asserts that the modulus of elasticity and hardness of the claimed adhesive after cure "would be inherent upon combining the materials in the manner" taught by Salfelder. *Id.*

The Applicant respectfully submits that the present invention is not obvious in view of Bloomfield and Salfelder, as the Office Action asserts. Specifically, the Application discloses that through experimentation it was learned that the joining and sealing of a fuel cell could be significantly improved if the humidity at the sealing edges were controlled, the modulus of elasticity and the hardness of the cured adhesive were kept below 10MPa and 90, respectively (because, it was learned, the adhesive would then be capable of expanding and contracting

with the polymer electrolyte film as the film expands and contracts), and, importantly, that the numerical values of the modulus of elasticity and durometer A hardness of the adhesive after cure could be dramatically changed by suitably varying the mixing rates of the epoxy and silicone components of the adhesive. Application at 17:16-20:6; Figs. 5-9 (describing and showing graphically the results of experimental measurements from which the dramatically improved adhesive performance results were observed).

None of the foregoing results can be discerned from or are “inherent” in either Bloomfield or Salfelder. As the Office Action states, Salfelder merely teaches that “polyurethanes, epoxies, and silicones are all conventional materials for adhering two objects together.” Salfelder does *not* teach that the properties of mixtures of these adhesives vary in a non-linear manner with different mixtures of the materials or otherwise suggest that dramatic changes in adhesive modulus of elasticity or durometer A hardness might be achieved by varying the proportions of epoxy and silicone adhesive. Further, nothing in either Salfelder or Bloomfield, either alone or in combination, teaches or suggests the dramatic improvement in fuel cell adhesive performance in the elasticity modulus and hardness ranges set forth in the pending claims.

Because Bloomfield and Salfelder do not teach or suggest the features of claims 8-11, 13-15 and 18-19, these claims are patentable under § 103(a). The Applicant accordingly respectfully requests reconsideration and withdrawal of the pending § 103(a) rejections of claims 8-11, 13-15 and 18-19.

**2. Claims 1-6 and 17 Are Patentable Over Bloomfield, Salfelder and JP 9-199145.**

The Applicant respectfully traverses the § 103(a) rejections of claims 1-6 and 17 over Bloomfield and Salfelder in view of JP 9-199145. As noted above, Bloomfield and Salfelder do not teach or suggest, either alone or in combination, all the elements of the present invention. The deficiencies of these references are not cured by JP 9-199145.

JP 9-199145 is cited by the Examiner as teaching "a fuel cell in which the edge of the polymer electrolyte is made hydrophobic before being bonded to the separators." Office Action at 4. The Examiner then asserts that the present invention "as a whole would have been obvious . . . because the Japanese reference exemplifies that the practice of making the sealing portions of a polymer electrolyte membrane hydrophobic is well-known in the art." *Id.*

The Applicant respectfully submits that JP 9-199145 does not teach or suggest the present invention's water concentration reduction. JP 9-199145 teaches that an electrolyte film is sectionally immersed in a potassium hydroxide solution so that a particular portion of the electrolyte film will be hydrophobic. Having been immersed in the potassium hydroxide solution, it is impossible for the electrolyte film to have a molar water fraction of less than 4, as claimed in the present invention. Further, as is evident from JP 9-199145 Figs. 2, 3 and 6-8, JP 9-199145 discloses a complicated process and equipment in which preventive measures are required to prevent a foreign body (required for the operation in which the edge of the film is made hydrophobic) from entering the operating portion of the fuel cell. The present invention on the other hand, has a simple structure, using air with controlled temperature and relative humidity to obtain the desired low water concentration and resulting sealing improvement properties, without otherwise changing the properties of the electrolyte film (as in JP 9-199145). Application at 10:16-22.

For the foregoing reasons, JP 9-199145 does not teach or suggest the low water concentration method set forth in the present Application, and accordingly the present invention is not obvious under § 103(a) in view of the combination of Bloomfield, Salfelder and JP 9-199145. The Applicant therefore respectfully requests the pending § 103(a) rejection of claims 1-6 and 17 be withdrawn.

3. **Claims 12, 16 and 7 Are Patentable As a Result of  
Their Dependence On Allowable Claims 1, 8 and 13.**

The Applicant respectfully traverses the § 103(a) rejections of claims 12 and 16 in view of Bloomfield, Salfelder and Tamura and claim 7 in further view of JP 9-199145 on the grounds that claims 7, 12 and 16 depend from allowable claims 1, 8 and 13, respectively, and further define patentable subject matter. The Applicant respectfully requests the pending § 103(a) rejections of claims 7, 12 and 16 be withdrawn.

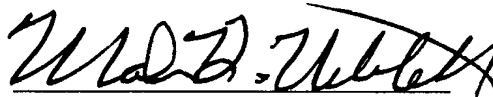
**Conclusion**

For the foregoing reasons, withdrawal of the pending rejections and issuance of a Notice of Allowance for claims 1-19 is earnestly solicited. The Examiner is invited to contact the undersigned to discuss any matter concerning this application.

The Office is authorized to charge any underpayment or credit any overpayment to Kenyon & Kenyon Deposit Account No. 11-0600.

Respectfully submitted,

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Mark H. Neblett  
Registration No. 42,028

KENYON & KENYON  
1500 K Street, N.W., Suite 700  
Washington, D.C. 20005-1247  
(202) 220-4232 (telephone)  
(202) 220-4201 (facsimile)